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An Examination of the Influence of Clicker Technology on College Student Involvement and Recall

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Educators in a variety of disciplines have used clicker technology to engage college students in the learning process. This study investigated the influence of clicker technology on student recall and student involvement in higher education. Student Involvement Theory was used to inform and guide this research. Student recall was evaluated using three experimental conditions (1) verbal review (review without PowerPoint slide or clicker technology), (2) slide review (review with a PowerPoint slide and verbal review), and (3) clicker review (review with a PowerPoint slide, verbal review, and clicker technology). Also, student surveys were used to identify perceptions of involvement. Some evidence of improvement in student recall was identified with clicker technology review when compared to PowerPoint slides combined with verbal review. Student surveys indicated that students preferred clicker technology over the other conditions. Students also perceived benefits of clicker technology at a classroom level and on an individual engagement level.

Students currently enrolled in higher education have experienced fast paced technological development during their lifetimes. On average, an 18-year-old spends over six hours a day with different media and technology sources (Roberts, Foehr, & Rideout, 2005). This new generation of college students has been referred to as digital natives (Courtois, Mechant, De Marez, & Verleye, 2009) because of their lifelong ease and adaptation to burgeoning technology. To meet the changing needs and preferences of their students, many educators attempt to enhance their students' educational experience by incorporating technology into the classroom learning environment (Kirkwood & Price, 2005).

Instructors in many higher educational settings are turning to personal response systems or clickers as a way of engaging technology-friendly students in large classroom settings (Caldwell, 2007). Clickers are electronic response systems that instructors can easily utilize in conjunction with PowerPoint presentations (Shapiro, 2009). Because clickers are hand-held personal devices, every student has the opportunity to respond to instructor questions/prompts and provide his or her vote or categorical choice by simply pushing a button on the device (Caldwell, 2007). Clicker technology allows instructors to display cumulative student responses, generate class discussion, and gauge students' grasp of important concepts. The technology itself has been around for over 40 years (Deal, 2007), but its popularity has increased in use with the advent of more affordable systems (Barber & Njus, 2007). A majority of university classrooms in the United States utilize clicker technology (Abrahamson, 2006). With the increased use of this technology, research interest is growing as to the effectiveness of clickers across pedagogical domains.

Student Involvement Theory

A decade ago, Astin (1999) sought to develop an inclusive theory of student development in higher education. The resulting Student Involvement Theory (SIT) emphasizes the physical and psychological energy that students invest in higher education (Astin, 1999). The SIT asserts that student involvement can be measured both quantitatively (amount of time, frequency) and qualitatively (student perceptions, understanding). The broadness of the theory allows researchers to use it to explain students' involvement in the classroom, independent academic work, and extracurricular activities. Astin (1999) posited that the amount of personal development and student learning within any educational program is directly proportionate to the quality and involvement in that program. Thus, educational program effectiveness can be based on the capacity of the educational practice to increase student involvement. Instructors can increase student involvement in many ways, including the use of clicker technology; however, we need more empirical support (both qualitative and quantitative) about whether clickers increase student involvement and improve student learning outcomes above and beyond other methods designed to improve student involvement.

Clicker Technology

Educators use clickers in a variety of academic fields. For example, recently published research on clicker technology addresses marketing (Sprague & Dahl, 2010), nursing (DeBourgh, 2008), psychology (Dallaire, 2011), computer information systems (Larsgaard, 2011), and biology (Crossgrove & Curran, 2008). Topics of pedagogical interest with clicker technology focus on satisfaction (Beckert, Fauth, &

Olsen, 2009), attendance (Shapiro, 2009), learning (Larsgaard, 2011), and student attitudes (Caldwell, 2007). Researchers have established that clicker technology increases attendance rates in university courses (Caldwell, 2007; Shapiro, 2009) but there continue to be mixed results concerning the influence of clicker technology with learning in higher education (Larsgaard, 2011). In general, student attitudes toward clicker technology have been positive (Beckert et al., 2009; Caldwell, 2007), but few studies have queried student perceptions of learning with clicker technology.

SIT asserts that student learning in any educational setting is directly associated with both program quality and student involvement (Astin, 1999). Typically, clicker technology researchers focus on measuring the learning (through examining student recall) or assessing the program quality and student involvement through student perceptions. Few studies have combined these techniques to examine both program quality and student involvement. Consistent with SIT, to gain a more complete understanding of student involvement and program quality with clicker technology researchers would need to examine both student recall and student perceptions concurrently.

Student Recall

In most cases, when researchers have investigated learning with clicker technology, they have evaluated the influence of using clickers in a classroom through students' ability to successfully recall correct responses on exams or quizzes. For example, Mayer et al. (2009) evaluated the influence of clickers on academic achievement over three conditions. All students in the sample completed an introductory psychology course, although each course occurred during different semesters over a three year time period. The first course did not use any technology, the second course used clicker technology, and the final course used group questioning without clicker technology. Mayer et al. (2009) evaluated student recall with total test scores to identify differences among the conditions. They found that clicker technology increased academic achievement when compared to the control group and discussion group. An acknowledged limitation was the use of three different classes (thereby different samples) over an extended time period (Mayer et al., 2009). Additional studies using comparable methodology similarly found that clicker technology improved student performance when total test scores were used as the outcome variable (Morling, McAuliffe, Cohen, & DiLorenzo, 2008; Yourstone, Kraye, & Albaum, 2008), however using the total test scores in courses may not be an accurate measure of recall improvement from clickers, because not all items on the exams were reviewed or learned using clicker technology. Alternatively, Shapiro (2009) used university psychology students to evaluate clicker's influence on student performance via individual test items that were specifically reviewed in class with clicker technology. She found that in classes where clicker technology was used, student performance improved across multiple formats of test questions (Shapiro, 2009).

These studies demonstrate the positive influence of clicker technology on student recall; however, additional studies suggest that clicker technology may not improve recall when compared to other teaching methodologies. For example, Larsgaard (2011) used four sections of computer information systems courses to evaluate clicker effectiveness. He randomly selected two class sections to use clicker technology and two class sections to use verbal response. All sections used the same PowerPoint slides with embedded questions and took the same pre- and post-tests. Larsgaard (2011) concluded that there were no statistically significant differences between the two conditions. All sections of the courses were designed to be interactive, thus Larsgaard (2011) suggested that it might be the interactivity, rather than the clicker technology, that led to statistical differences in previous studies on clicker technology. Similarly, two separate studies compared conditions of clicker technology, hand-raising, and flashcards as facilitators of classroom engagement (Elicker & McConnell, 2011; Stowell & Nelson, 2007). Stowell and Nelson (2007) used each condition during one class lecture and, on a quiz at the end of the lecture, found no significant differences between the conditions. Elicker and McConnell (2011) used the different methods of response with twelve sections of an introductory psychology course and with individual test items used to identify the influence of the different conditions on student performance. They did not find a relationship between the type of student engagement format and test performance. In sum, while there is some general support to suggest that clickers have positive influence on learning outcomes, more detailed analyses of clickers fail to find differences in student recall between different student engagement techniques (all of which require some student interaction).

Student Perceptions

Surveying students is a common way of understanding the value of clicker technology in the classroom. Several studies have indicated that, in general, students are satisfied with the use of clicker technology (Caldwell, 2007), regardless of class size (Beckert et al., 2009). Boatright-Hortwitz (2009) found that students reported that they were more likely to answer questions in the classroom with clicker technology than by speaking. In addition, students preferred the anonymity of clicker technology when

discussing sensitive course topics (e.g., racism, human sexuality). Beckert et al. (2009) found that the likelihood of students responding with clickers was especially true for shy and reserved students. Students perceived the most important use of the clicker technology was the opportunity to view questions similar to those on quizzes (Boatright-Hortwitz, 2009). Through student polling, researchers have established that international students, in particular, report that clicker technology enhanced their classroom participation (Sprague & Dahl, 2010).

A few researchers have looked at the students' perceptions of clicker technology on achievement in the class, understanding concepts, and learning in general. DeBourgh (2008) found that most nursing students were completely satisfied with clicker use in their educational program. These students indicated that they had better content understanding with clicker use. Additionally, a survey of marketing students found that they perceived that clicker technology benefitted both learning and participation (Sprague & Dahl, 2010). Dallaire (2011) investigated the relationship between student perceptions and final grades in the course. Psychology students who reported more clicker usage had higher grades in the course. If the students perceived four or more hindrances resulting from clicker use, they were more likely to have lower class grades (Dallaire, 2011). Finally, some descriptive designs of clicker use have paired both quantitative data and student reports. For example, researchers used four psychology classes to measure the effectiveness of clicker technology (Morling et al., 2008). Two instructors each taught a section with clicker technology and a section without it. They used exam scores to measure differences between students' academic achievement in the courses. The instructors also included five questions in the anonymous course evaluation assessing student perceptions of class engagement with clicker technology. Morling et al. (2008) found clicker technology had a small but positive effect on exam scores. Class evaluations revealed that students perceived that attendance was more important with the use of clicker technology (Morling et al., 2008). The two previously mentioned studies that compared multiple student engagement techniques also solicited student perceptions as part of their methodology (Elicker & McConnell, 2011; Stowell & Nelson, 2007). Neither study reported statistical significance between the different student engagement techniques. However, surveying highlighted different benefits or values of clicker technology. Two findings illustrate this point: (a) students gave feedback that is more honest with clicker technology compared to other feedback methods (Stowell & Nelson, 2007), and (b) students indicated that they preferred clicker technology to the other two methods (Elicker, & McConnell, 2011). Without using student perceptions, the researchers would have missed some of the potential advantages of clicker technology in student involvement. Using both exam score data and student perception data provides a richer context for understanding the benefits of clicker technology in course quality and student involvement.

Purpose of the Current Study

The purpose of this study was to further understand the relationship of clicker technology to student involvement and recall in the classroom. Theory suggests that if a tool like a clicker increases student involvement, it is likely to also assist in the learning of material. The literature review indicated that while students have positive perceptions of clickers, there are mixed findings on whether or not clickers improved recall, especially when compared to other various engagement techniques that also include student involvement. The current study used three different review conditions in two human development courses. Conditions included verbal review with no visual engagement techniques, PowerPoint slides combined with verbal review, and Clicker review combined with both PowerPoint slides and verbal review. To gain a more complete contextual understanding of the influence of clicker technology on student involvement and recall, both individual exam item responses and student surveys were used to assess student learning and perceptions of the technology.

Method

Participants

The 287 participants in this study consisted of students in two large 100-level human development courses in a public university in the southwestern United States. The predominantly white (92%) female (89%) student participants had mostly freshman or sophomore status. All of the 287 participants' exam responses were used to assess for student recall. Total class attendance on the day of the survey was approximately 160. The number of participants who completed the survey portion of the study was 153, which indicated a voluntary response rate for the survey of 96%. These survey participants were representative of the total sample in all demographic characteristics.

Procedure

Students with two instructors teaching different sections of the same introductory course in human development participated in this study. The two instructors had similar teaching evaluation scores from

previous semesters, with scores for both instructors exceeding department, college, and university averages. As part of the course requirements, students in these courses were expected to acquire an *I-Clicker* device (the participating university adopted this brand of clicker technology) at the beginning of the semester. Hereafter, the I-Clicker device will be referred to as a clicker. Throughout the semester, instructors of the two courses routinely used clickers to track attendance and engage students in lecture participation. Students were required to bring their own clickers to class daily.

Design to Test Clicker Effectiveness in Student Recall

Prior to beginning the semester, 12 identical multiple-choice exam questions (four from each exam) were selected from the first three exams offered in the courses. The two instructors both included these items on their exams, were both responsible for teaching their students the material on specific review days, and both used a variety of student engagement techniques during the review. On the specified review days, the participating instructors used clickers at their own discretion throughout the lecture, but they also held regular review sessions with pre-defined conditions at the conclusion of each lecture. Three experimental conditions were used in this study: (1) verbal review (i.e., review without PowerPoint slide or clicker technology), (2) slide review (i.e., review with a PowerPoint slide and verbal review), and (3) clicker review (i.e., review with a PowerPoint slide, verbal review, and clicker technology). The instructors developed similar review questions without using the exact exam questions for each of the review conditions. Recorded item responses from each student exam were coded as correct (1) or incorrect (2). The predetermined conditions for each class were as follows: exam one (clicker review and verbal review), exam two (verbal review and slide review), and exam three (slide review and clicker review). As with previous studies on clicker technology and learning, student exam items were used to evaluate the influence of clicker technology on student recall (see Shapiro, 2009).

Perceptions of Effectiveness

To assess students' perceptions of the effectiveness of clicker technology a 19-question survey was administered on the same day in both classes after the completion of exam three. In addition to basic demographic information, the survey assessed the perceived helpfulness of clickers in the classroom, individual student factors influenced by clicker technology (i.e., confidence, attention, retention, and learning), classroom factors influenced by clicker technology (i.e., preparation for exams, participation, and classroom discussion), and the perceived effectiveness of the different types of reviews (i.e., verbal, slides, and clicker). The survey was completed with questions appearing on a PowerPoint slide and students responding with their clickers on a scale of A (*strongly agree*) to D (*strongly disagree*). The survey took approximately 10 minutes to complete and was administered at the beginning of each of the classes. Student responses were compiled using software that accompanies the I-Clicker and identifiable information was immediately removed to protect student confidentiality.

Results

Student Recall

To test for differences in student recall across the various review session conditions, we calculated class mean scores for each exam item. Mean differences were assessed using *t*-tests. Table 1 presents a summary of findings comparing student performance over the three different conditions. Exam one generated no significant differences in student performance when comparing clicker review and verbal review. On the second exam, test items two ($t(248) = 2.273$, $p = .000$) and three ($t(248) = 5.438$, $p = .000$) were statistically different, with students in the slide review condition outperforming students in the verbal review condition. Finally, exam three also resulted in two significantly different exam items. On this exam, more students in the clicker review condition answered test items two ($t(243) = 3.148$, $p = .000$) and three ($t(243) = 2.490$, $p = .01$) correctly when compared to students in the slide review condition.

Student Perceptions

Student responses from the in-class survey were combined for the two courses. Frequency tables were generated to determine student perceptions of clicker technology. On the item that addressed the general helpfulness of clicker technology in a classroom setting, the majority of students (79%) agreed or strongly agreed that clickers were a helpful classroom learning tool.

Figure 1 shows the percentages of student agreement of four questions that assessed the perceived influence of clicker technology on individual student factors. Students frequently agreed that clicker technology improved their confidence (79.4%), attention (81.9%), retention (63.4%), and learning (75.3%) in the classroom.

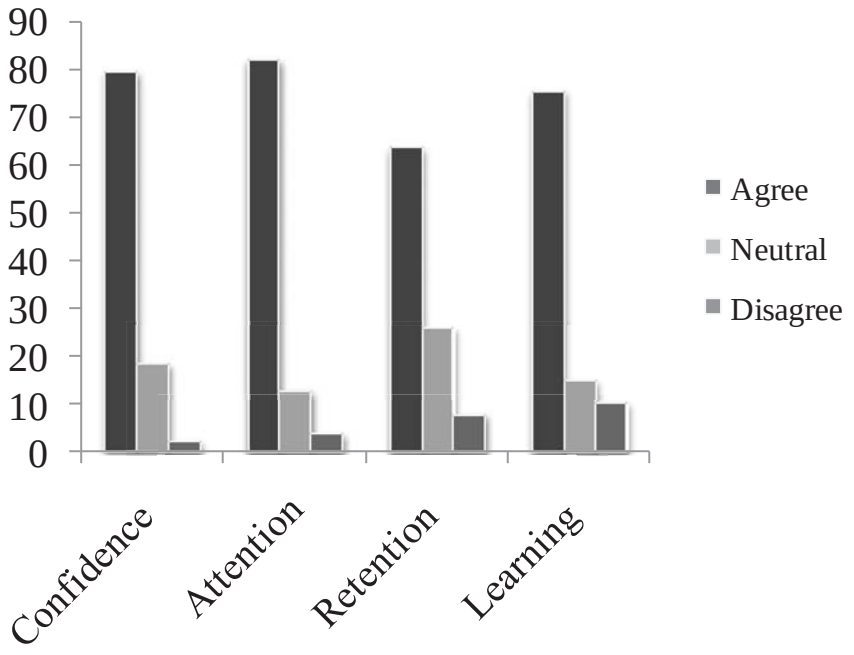
Three questions were used to specifically evaluate student perceptions of clicker technology on classroom

Table 1
Mean Comparisons of Student Test Items Over Three Conditions of Student Engagement in the Classroom

Exam Items		Course A Conditions	Course B Conditions	*t*	*p*
		Clicker Review	Verbal Review		
Exam 1	Item 1	1.04	1.08	-1.437	.152
	Item 2	1.30	1.23	1.356	.176
	Item 3	1.35	1.29	.947	.344
	Item 4	1.08	1.13	-1.347	.179
		Verbal Review	Slide Review		
Exam 2	Item 1	1.10	1.03	2.273	.024*
	Item 2	1.19	1.05	3.694	.000*
	Item 3	1.35	1.09	5.438	.000*
	Item 4	1.34	1.26	1.287	.199
		Slide Review	Clicker Review		
Exam 3	Item 1	1.09	1.05	1.308	.192
	Item 2	1.27	1.12	3.148	.002*
	Item 3	1.23	1.12	2.490	.013*
	Item 4	1.20	1.26	-1.130	.260

Note. * indicates a $p < 0.05$. Test items were scored as 1 (*correct*) and 2 (*incorrect*), thus a higher mean value indicates more incorrect responses on the item.

Figure 1
Student Perceptions on the Influence of Clicker Technology on Their Individual Learning Factors



Note. The bars represent the percentage of agreement with statements concerning clicker technology and the specific student learning factor.

factors. The first question asked students if they participated more during the class when clicker technology was used. The majority of students (72.0%) agreed or strongly agreed with this statement. The second question assessed whether clicker technology better prepared them for the class exams. Approximately half (52.0%) of the students perceived a benefit of clicker technology with test preparation. The third question examined clicker technologies influence on class discussion. Slightly over half of the students (55.8%) agreed or strongly agreed that clicker technology led to more interactive or livelier class discussions.

Two final questions evaluated students' perceptions of the different types of engagement techniques or conditions used in this study. The first question asked students to indicate their preference when reviewing class information. Students were given the options of reviewing verbally, reviewing verbally with a slide prompt, and reviewing with clicker technology (including verbal/slide prompt). The most common selection for preference was reviewing with clicker technology (71.3%). The second question further investigated students' perception of the effectiveness of clicker technology when compared to the use of a slide prompt alone for review. Students (70.4%) overwhelmingly perceived clicker technology to be more effective than just using a slide prompt for review.

Discussion

The current study identified significant differences in student recall (scores on exam items) using three different review methods for the material. The use of PowerPoint slides resulted in significantly better test results when compared to verbal review alone, and clicker technology resulted in significantly more correct responses than the PowerPoint slide review (on the third exam). Previous studies that have compared clicker technology and different student engagement techniques have not found significantly better results from clicker technology use (see Elicker & McConnell, 2011; Stowell & Nelson, 2007), although our findings would suggest that the technology may aid in better recall, at least compared to just using a PowerPoint slide for review. It is interesting to note that in the current study, there were no significant differences between clicker technology and verbal review on exam one. It is possible that clicker technology will be more effective when students already feel involved in the course and have a familiarity with the technology and the testing approach of the instructors. In general, the results from the current study are consistent with Student Involvement Theory that states that students' involvement may increase with educational program effectiveness (Astin, 1999). Using visual and interactive engagement techniques resulted in better student learning, as compared to just using the visual engagement alone. It should be noted, however, that our clicker condition for reviewing material was not universally better than the other conditions across all exams; thus, based on our results alone, we cannot conclude that clickers are consistently "better" than other classroom engagement techniques.

A strength of our study is the inclusion of student perceptions, in addition to the exam item recall outcomes. The SIT posits that student involvement should be measured both quantitatively and qualitatively (Astin, 1999). Identifying students' perceptions allowed for a more complete understanding of the usefulness of clicker technology in student involvement. Consistent with previous research (Caldwell, 2007), students reported high satisfaction and perceived clicker technology as a helpful classroom tool. These findings fit within the context of existing research that indicates that students report increased participation when clicker technology is implemented in the classroom (Beckert et al., 2009).

Unique from previous research on student perceptions of clicker technology, this study investigated student factors, classroom factors, and engagement method preference concurrently. Students consistently reported that clicker technology helped with individual student learning, classroom discussions, and exam preparation. Students indicated that they preferred reviews with clicker technology to the other conditions. They also perceived clicker technology reviews to be more effective than PowerPoint slides alone (which was consistent with the results from test item analysis), which may be important in light of previous studies that suggest that student perception is related to performance (Dallaire, 2011). Evaluating student involvement using both kinds of data collection procedures provided some evidence to the relationship of clicker technology and subsequent student recall, but it also indicated that students perceived the technology as a way to facilitate increased engagement.

Limitations

Results from this study provide additional evidence regarding the effectiveness of clicker technology in relation to student recall. However, the design employed in this study is not a true experimental design and results cannot be interpreted as causal. Additionally, the conveniently attained student participants were enrolled in courses that required the use of clicker technology. The technology was used to track attendance and reward participation. It is possible that satisfaction could be related to the benefit to their grade in the classes that using the technology provided.

Future research should attempt to evaluate clicker technology in a classroom setting where grades are not associated with the use of clickers.

Conclusions and Implications

Students enrolling in higher education are, as a group, digital natives, regularly engaged by technology (Courtois et al., 2009), and clicker technology is frequently used in higher education classrooms. While much of the existing research in this expanding field remains atheoretical, using Student Involvement Theory as a framework has made it clearer that student involvement can be measured by looking at both the quantity and quality of their involvement. The current study provides some evidence regarding the effectiveness of clicker technology use over other instructional engagement techniques with student recall. This finding was consistent when comparing student test items over different conditions and with student perceptions. The students largely perceive the benefits of clicker technology on a personal learning level and at a classroom engagement level. Instructors in higher education may consider adopting the use of clicker technology as one method of increasing student achievement and involvement the classroom.

References

Abrahamson, L. (2006). A brief history of networked classrooms: Effects, causes, pedagogy, and implications. In D. A. Banks (Ed.), *Audience response systems in higher education: Applications and cases* (pp. 1-25). Hershey, PA: Idea Group.

Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 40*, 518-529.

Barber, M., & Njus, D. (2007). Clicker evolution: Seeking intelligent design. *CBE-Life Sciences Education, 6*, 1-8. doi:10.1187/cbe.06-12-0206

Beckert, T., Fauth, E., & Olsen, K. (2009). Clicker satisfaction for students in human development: Differences for class type, prior exposure, and student talkatively. *North American Journal of Psychology, 11*, 599-612.

Boatright-Hortwitz, S. L. (2009). Useful pedagogies or financial hardships? Interactive response technology (clickers) in the large college classroom. *International Journal of Teaching and Learning in Higher Education, 21*(3), 295-298.

Caldwell, J. E. (2007). Clickers in the large classroom: Current research and best-practice tips. *Life Sciences Education, 6*(1), 9-20. doi:10.1187/cbe.06-12-0205

Courtois, C., Mechant, P., De Marez, L., & Verleye, G. (2009). Gratifications and seeding behavior of online adolescents. *Journal of Computer-Mediated Communication, 15*, 109-137. doi:10.1111/j.1083-6101.2009.01496.x

Crossgrove, K., & Curran, K. L. (2008). Using clickers in non-majors and majors-level biology courses: Student opinion, learning, and long-term retention of course material. *Life Science Education, 7*(1), 146-154. doi:10.1187/cbe.07-08-0060

Dallaire, D. H. (2011). Effective use of personal response "clicker" systems in psychology courses. *Teaching of Psychology, 38*(3), 199-204. doi:10.1177/0098628311411898

Deal, A. (2007). Classroom response systems. *Teaching with Technology, 30*, 1-14.

DeBourgh, G. A. (2008). Use of classroom "clickers" to promote acquisition of advanced reasoning skills. *Nurse Education in Practice, 8*(2), 76-87. doi:10.1016/j.nepr.2007.02.002

Elicker, J. D., & McConnell, N. L. (2011). Interactive learning in the classroom: Is student response method related to performance? *Teaching of Psychology, 38*(3), 147-150. doi:10.1177/0098628311411789

Kirkwood, A., & Price, L. (2005). Learners and learning in the twenty-first century: What do we know about students' attitudes towards and experiences of information and communication technologies that will help us design courses? *Studies in Higher Education, 30*(3), 257-274. doi:10.1080/03075070500095689

Larsgaard, J. (2011). Clickers in the classroom: Do they enhance good pedagogy or just patch a problem? *Journal of Research in Business Information Systems, 4*, 69-79.

Mayer, R. E., Stull, A., DeLeeuw, K., Almeroth, K., Bimber, B., Chun, D., . . . & Zhang, H. (2009). Clickers in college classrooms: Fostering learning with questioning methods in large lecture classes. *Contemporary Educational Psychology, 34*(1), 51-57. doi:10.1016/j.cedpsych.2008.04.002

Morling, B., McAuliffe, M., Cohen, L., & DiLorenzo, T. M. (2008). Efficacy of personal response systems ("clickers") in large, introductory classes. *Teaching of Psychology, 35*(1), 45-50. doi:10.1080/00986280701818516

Roberts, D. F., Foehr, U. G., & Rideout, V. (2005). *Generation M: Media in the lives of 8 18-year-olds*. Menlo Park, CA: Kaiser Family Foundation.

Sprague, E., & Dahl, D. W. (2010). Learning to click: An evaluation of the personal response system clicker technology in introductory marketing courses. *Journal of Marketing Education, 32*(1), 93-103. doi:10.1177/0273475309344806

Shapiro, A. (2009). An empirical study of personal response technology for improving attendance and learning in a large class. *Journal of Scholarship of Teaching and Learning, 9*, 13-26.

Stowell, J. R., & Nelson, J. M. (2007). Benefits of electronic audience response systems on student participation, learning, and emotion. *Teaching of Psychology, 34*(4), 253-258. doi:10.1080 /00986280701700391

Yourstone, S. A., Kraye, H. S., & Albaum, G. (2008). Classroom questioning with immediate electronic response: Do clickers improve learning? *Decision Sciences Journal of Innovative Education, 6*(1), 75-88. doi:10.1111/j.1540-4609.2007.00166.x

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